introduction as a means of illumination was very gradual and slow in Greece, yet by the end of the fifth century B.C. they were probably in general use at least among the upper ranks of society. The lamp of which Herodotus speaks, which we have mentioned above, differed in no respect from that in use at Rome, the wick (*θρυαλλίς*) being made from the woolly leaves of an indigenous plant, which was passed through the nose (*μυκτήρ*) of the lamp into the crude olive oil.

So much for the methods of lighting in use in ancient times.

It is worthy of notice how the two elements of fire and light have ever been invested with divine attributes and set up for worship. The Persian monarchs have silver fire trays borne before them into battle. The Lychnokaie, the lamp feast of the Egyptians, referred to above, has a representative in the Chinese feast of lanterns, which takes place on the 15th of the first month. Not only this, but lamp festivals have been common to all nations. The Greeks had their *λαμπαδη-δρομία*, the Romans their Lupercalia, the latter of which gave way to the institution of Pope Gelasius, Candlemas, unless it be, as some have it, that Virgilius supplanted the Pro-erpina by this festival, but in any case they are both candle festivals. We learn from Pliny's "Natural History" that the Romans used wax candles in certain rites. They lighted lamps too in honour of Prometheus, who caught fire from heaven; of Minerva, who gave them oil; and of Vulcan, the originator of lamps; they had their *fax belli*, the war torch, the *fax nuptialis*, the marriage emblem.

Lamps, too, filled with scented oil were placed on the tombs of the dead. An oracular statue of Hermes in Achaia was "worked" by lighting a lamp before him and placing a small coin at his feet. Then there is the eternal lamp of Vesta, which was tended by damsels of establi-hed reputation, the ever-lighted lamps of Mahomet's tomb, Aaron's tabernacle, and Roman Catholic churches. Again there are those lamps in tombs said to have been found burning after the lapse of centuries. Boyle made a series of experiments with the air-pump which demonstrate the absurdity of such a belief. Mr. Field, however, suggests the possibility of an asbestos wick communicating with a supply of light naphtha burning in a tomb not absolutely air-tight as a way out of the difficulty, and concludes by indorsing Lamb's opinion of our badly-illuminated forefathers, that "one can never hear mention of them without an accompanying feeling as though a palpable obscure had dimmed the face of things, and that our ancestors wandered to and fro—groping."

THE ROYAL SOCIETY OF CANADA

THE second annual meeting of the Royal Society of Canada was held at Ottawa during May 22–25. The officers who had been elected at the close of the last meeting were all present, viz. :—President, Principal Dawson, C.M.G., F.R.S.; Vice-President, Hon. P. J. O. Chauveau, LL.D.; Hon. Secretary, J. G. Bourinot, B.A.; Hon. Treasurer, J. A. Grant, M.D. Besides the members of the Society, there were present also delegates from the various local literary and scientific societies of Canada and from several British and foreign societies. Interesting inaugural addresses were delivered by His Excellency the Governor-General, who is Patron and Honorary President, by Principal Dawson, and by the Hon. Dr. Chauveau.

The report of the Council showed that a favourable answer had been received to the memorial to her Majesty the Queen, asking her gracious permission to name the Society the Royal Society of Canada; that an Act of Incorporation had accordingly been passed by the Dominion Parliament, and a sum of 1000*l.* sterling voted to assist in the payment of the expenses of publishing Transactions; and that steps had already been taken towards the formation of a national museum.

A considerable portion of the time of the Society was occupied by the discussion of a draft constitution which was submitted by the Council.

An address was presented by the Society to His Excellency the Marquis of Lorne expressive of the gratitude of the members of the Society to him for the efforts he has made during the time of his Governor-Generalship to further the interests of literature, science, and art.

Several interesting papers were read in the French and English Literature, History and Archæology Sections.

SECTION OF MATHEMATICAL, PHYSICAL, AND CHEMICAL SCIENCES

The following papers were read in this Section, which was presided over by T. Sterry Hunt, F.R.S. :—(1) Prof. J. G. MacGregor, D.Sc., Halifax, N.S., on "Experiments showing that the Polarisation of Electrodes is independent of their Difference of Potential." The same current was passed through two electrolytic cells (in series) containing dilute sulphuric acid and platinum electrodes. The cells had the same section but differed in length. The electrodes, therefore, differed in potential during the passage of the current, while the current had in both cells the same density. Curves showing the variation with time of the electromotive force of the respective cells after the cessation of the polarising current were drawn, and were found to coincide. The measurements of difference of potential were made by means of the quadrant electrometer. (2) Prof. B. J. Harrington, Ph.D., Montreal, on "An Analysis of two Minerals recently discovered in Canada—Meneghinite and Tennantite." During the discussion of this paper Dr. J. H. Ellis, of Toronto, exhibited a specimen of tellurium which he had extracted from the gold ores of Lake Superior. (3) C. Baillargè, C.E., Quebec, on "Hints to Young Geometers." (4) Prof. E. Haanel, Ph.D., Cobourg, on "Hydriodic Acid as a Blowpipe Reagent." The author had already proposed to use hydriodic acid as a blowpipe reagent in the case of four metals. This paper described the results of experiments made to extend its employment to others. Instead of charcoal he used flat plates of plaster of Paris, and in the case of all the metals which had been at the author's disposal, the blowpipe brought out on these plates easily distinguishable characteristic colours. Owing to the difference of volatility (chiefly) of the products of decomposition, three or four metals could be detected as present in a mineral by a single test, so distinctive are the colours of the iodides and other compounds formed. Prof. Haanel gave most successful experimental illustrations of the new method before the Section. (5) Prof. Coleman, Cobourg, on "The Spectra of certain of the Characteristic Colours of Prof. Haanel's Method of Blowpipe Analysis." (6) Prof. N. F. Dupuis, A.M., Kingston, on "The Construction of a Clock intended to show both Mean and Sidereal Time." The author had constructed the clock described; it gave a much closer approximation to accuracy than any such instrument hitherto proposed. (7) E. Deville, C.E., Ottawa, on "The Measurement of Terrestrial Distances by Astronomical Observations." The author deduced expressions for such distances in terms of differences of latitude and of azimuth respectively, and showed the influence of various sources of error in the use of these expressions. (8) T. McFarlane, M.E., Montreal, on "The Reduction of Sulphate of Soda by Carbon." (9) C. Baillargé, C.E., Quebec, on "Simplified Solutions of two of the more difficult cases in Hydrographic Surveying," and on "The Measurement of Surveys by Spherical Triangles and Polygons on a Sphere of any Radius." (10) Sandford Fleming, C.M.G., Ottawa, on "The Adoption of a Universal Meridian for the Regulation of Time." The author showed that the proposal he had made some years ago was meeting with a favourable reception. In connection with this paper the Section adopted a resolution urging the Society to memorialise the Governor-General, asking that he use his influence to induce the Imperial Government to grant representation to Canada at the International Conference on Standard Time to be held at the invitation of the President of the United States. (11) Reports by Prof. A. Johnson, LL.D., Montreal, and C. H. Carpmall, M.A., Toronto, Superintendent of the Meteorological Service, on "The Preparations made for the Observation of the Transit of Venus in Canada, and on the Observations which had been made." (12) Dr. J. H. Ellis, Toronto, on "A Remarkable Sulphur Spring near Port Stanley," and on "A Method by which the Tannin Determination of Löwenthal might be utilised for the Detection of Impurities or Adulterations in Spices." (13) F. W. Gisborne, Esq., Ottawa, on "Recent Improvements in Practical Telegraphy." (14) T. McFarlane, M.E., Montreal, on "The Decomposition of Zinc Sulphate by Common Salt." (15) T. Sterry Hunt, F.R.S., on "The Mechanical Transfer of Matter in the process of Segregation."

Prof. Cherriman, M.A., Ottawa, was elected president, Mr. T. McFarlane vice-president, and Prof. A. Johnson secretary of the Section for the next year.

SECTION OF GEOLOGICAL AND BIOLOGICAL SCIENCES

A. R. C. Selwyn, F.R.S., Director of the Geological Survey of Canada, presided over this section. The following papers were read :—(1) Dr. Selwyn, on "Notes on the Geology of Lake Superior." The points insisted on were: the conformity of the Laurentian and Huronian divisions of the older crystalline rocks; the Lower Cambrian age of the upper copper-bearing

rocks of Logan, called Animikie, Nepigon, and Keweenian, by Dr. Hunt, and the unconformity of the Animikie divisions to the underlying Huronian, by some geologists in the United States supposed to be of the same age. (2) Mr. W. Saunders, of London, Ont., "On the Influence of Sex on Hybrids among Fruits." This paper gave some of the results of Mr. Saunders's experience in hybridising fruits. The facts cited confirmed the view that the influence of the female is more strongly expressed in the habit, character of growth, and constitution of the vine, bush, or tree, while the influence of the male is more distinctly seen in the form, colour, and quality of the fruit, and in the case of hybrid grapes in the size and form of the seeds also. (3) Mr. G. F. Mathew, of St. John, N.B., on "The Method of distinguishing Lacustrine from Marine Deposits," based on careful observations on the deposits now taking place and accumulated since the Pleistocene period in lakes in New Brunswick. (4) Dr. J. A. Grant, of Ottawa, on "The Inferior Maxilla of the *Phoca Grœnlandica* from Green's Creek, near Ottawa. (5) Principal Dawson, of Montreal, on "Spores and Spore-cases, from the Erian Rocks." The author referred to the discussion many years ago by the officers of the Geological Survey of a bituminous shale at Kettle Point, Lake Huron, of vast numbers of minute round disks, which were recognised as the spore-cases of some cryptogamous plant, and named *Sporangites Huronensis*. More recently Prof. Orton, of Columbus, Ohio, Prof. Williams, of Cornell, and Prof. Clarke, of Northampton, have found in the Erian and Lower Carboniferous shales of Ohio and New York beds replete with these organisms, and Prof. Orton has shown reason to believe that they are connected with filamentous stems found in the same layers, and also that they have contributed largely to the bituminous matter present in the shales in which they occur. Similar bodies have also been found associated with the curious plants known as Ptilophyton and Trochophyllum. Still more recently specimens from the Erian of Brazil have been sent to the author by Mr. Darby, of the Brazilian Geological Survey, which seem to throw additional light on these bodies. They are oval or rounded or in the form of flattened sacs, containing numbers of rounded disks, and so closely resembling the utricles or spore sacs of the Rhizocarps as to make it extremely probable that they belonged to plants of this class. Should this conjecture be sustained by subsequent inquiries it would show that this peculiar group is of much greater antiquity than hitherto supposed, and that these plants were extremely abundant in the shallow waters of the Erian period. Dr. Dawson suggests the probable relation of these singular fruits not only with the Ptilophyton, but also with the other Erian and Silurian plants. (6) E. Gilpin, jun., on "The Folding of the Carboniferous Group in the Maritime Provinces." The author described each of its great subdivisions as exposed at various points, and showed that during the Carboniferous period, in addition to the continental changes of level, giving rise to conditions of deposition characterising the carboniferous limestone, millstone, grit, &c., there were extensive foldings of a more local character, apparently in some cases marking the closing of these oscillations, These foldings and their subsequent denudations have played an important part hitherto but little studied in modifying the conditions arising from the larger and more extended movements which have hitherto principally received attention, and present the district as being far from an universal state of quiet and regular succession during the Carboniferous age. (7) Prof. R. Bell, M.D., on "The Causes of the Fertility of the Land in the Canadian North-west Territories." In the Canadian North-west a vast fertile tract stretches, with certain exceptions, from the Red River Valley to the Liard River, a distance of some 1400 miles. The soil of this tract was characterised as a dark loam, of varying depth, and of a nearly homogeneous consistency. The primary cause of the fertility of this region was the abundance of the underlying crude material out of which a finished soil could be made. This was derived partly from the widespreading crustaceous marls which were nearly coextensive with the fertile tract, and probably from the drift during the Glacial period. Dr. Bell next considered the process by which the black loamy soil was formed out of this subsoil, and he considered that the main agency was the work of moles and other burrowing animals. Worms appeared to be absent in the North-west, owing principally to the frost penetrating into the ground beyond the depth to which worms can burrow, but the moles and the ground squirrels, or gophers, more than make up for their absence. In the fertilised tracts the old and new mole-hills cover the whole surface, rendering it "hummocky," which may be easily observed after the prairie has been swept by a fire. The badgers often did what was compared to subsoil ploughing. All the animals referred to were very active in the autumn, digging many more burrows than appeared to be of any use to themselves. Each hummock thrown up by the moles covered about a square foot, and buried all the grass, &c., on this space. In this manner large quantities of vegetable matter were ultimately incorporated with the soil. The work of the moles also acted in another way in refining the soil, for they left behind the stones and coarse gravel, so that these in time became sunk beneath the layer of mould produced. By an interesting coincidence at the season when the burrowing animals are most active, the prairie vegetation is mature, and contains the largest amount of substance. The coldness of the soil during the most of the year tended to preserve the organic matter in it. While the circumstances given were the direct cause of its fertility, the ultimate reason was perhaps to be looked for in the climate of the North-west, for to this was due the growth of the vegetation which formed the manure and the food of the little workers which mingled it with the soil. Thus we could trace a mutual dependence of the circumstances which together have given to our North-west Territories that surpassing fertility of soil which cannot fail to attract to it a vast population. (8) Dr. G. M. Dawson, on "Notes on Triassic Rocks of the West," discussing the question as to the Triassic or Jurassic age of deposits found in British Columbia and the Rocky Mountains, and their correlation with the deposits of similar age in the territory of the United States. (9) Prof. L. W. Bailey, Ph.D., Fredericton, on "The Occurrence of Indian Relics in New Brunswick," probably deposits found at an old camping ground of the Malicete Indians. (10) Dr. T. Sterry Hunt, on "Studies on Serpentine Rocks." (11) Prof. J. Macoun, on "Notes on Canadian Polypetalæ." The geographical distribution of these plants in Canada was discussed, and interesting facts were adduced in connection with the number of species and genera in each order which showed certain relations between the present flora and that which had existed in the Tertiary period. (12) A paper by Mr. R. Chalmers was communicated by Principal Dawson, in which facts were stated showing important erosion on the coast of the Bay des Chaleurs by floating ice in the modern and later Pleistocene periods.

Dr. Selwyn, Prof. Lawson of Halifax, and J. F. Whiteaves, were re-elected president, vice-president, and secretary of the Section respectively.

The following were the officers elected by the Society for the present year:—President, Hon. P. J. O. Chauveau, LL.D.; Vice-president, T. Sterry Hunt, F.R.S.; Hon. Secretary, J. G. Bourinot, B.A.; Hon. Treasurer, J. A. Grant, M.D.

THE HYPOPHYSIS CEREBRI IN TUNICATA AND VERTEBRATA

IN most simple Ascidians the single nerve ganglion is situated near the anterior end of the body, and between the branchial and atrial apertures. In species where the atrial aperture is near or at the posterior end of the body, the ganglion may also be placed far back, but it still lies between the two apertures and always indicates the dorsal side of the branchial. The ganglion is usually elongated, and gives off nerves at both ends—one set anteriorly and ventrally towards the branchial aperture, the other set posteriorly and dorsally towards the atrial. In close relation with the ganglion are found two organs—the neural gland and the dorsal tubercle—which have been much written about, but apparently will bear a good deal of further investigation.

The neural gland lies upon the ventral and posterior face of the nerve ganglion, and consists of a number of more or less ramified cæcal tubules springing from a central space or tube immediately below the ganglion. The presence of this organ was first distinctly pointed out by Albany Hancock in 1868,[2] but until quite recently its function was not only totally unknown, but had been scarcely investigated.

The dorsal tubercle was described by Savigny in 1816[3] under the name of "tubercule antérieur." Since then it has received many names, but has usually been regarded as some sort of ol-

[1] Abstract of a paper read before the Royal Society of Edinburgh, April 2.

[2] *Journ. Linn. Soc.* (*Zool.*), vol. ix.

[3] "Mémoires sur les Animaux sans Vertèbres," pt. ii. fasc. 1. (Paris, 1816.)